

Hybrid Electrostatic/Flextensional Deformable Membrane Mirror for Lightweight, Large Aperture and Cryogenic Space Telescopes, Phase II

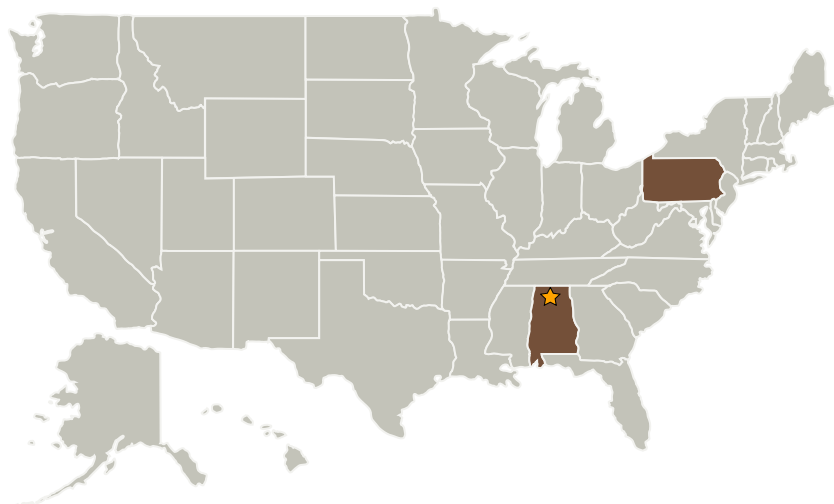
II
Completed Technology Project (2006 - 2008)



Project Introduction

TRS Technologies proposes innovative hybrid electrostatic/flextensional membrane deformable mirror capable of large amplitude aberration correction for large aperture and light weight space telescopes, and proposes to investigate the performances of single crystal piezoelectric actuators in space environment. The innovative hybrid deformable mirror concept is expected to eliminate actuator cross talk in electrostatic membrane mirror, while the large stroke ($> 300 \mu\text{m}$) flextensional actuators provide large dynamic range by more than an order of magnitude over the current state of the art. The proposed membrane DM retains the characteristics of membrane mirrors such as light weight, adaptable to large aperture and low cost. Flextensional actuator arrays with stroke of $> 300 \mu\text{m}$ will be developed and a hybrid electrostatic/flextensional membrane deformable mirror will be prototyped and characterized. The single crystal piezoelectric actuators produced at TRS offer large stroke, low hysteresis, and an excellent cryogenic strain response. Further investigation on using single crystal piezoelectric actuators in space environment will explore the possibility of using low profile, lightweight, and high performance piezoelectric actuations for positioning, alignment and shape control in space applications.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
TRS Ceramics, Inc.	Supporting Organization	Industry	State College, Pennsylvania

Primary U.S. Work Locations	
Alabama	Pennsylvania

Project Transitions

 **December 2006:** Project Start

 **November 2008:** Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.2 Thermal Control Components and Systems
 - └ TX14.2.8 Measurement and Control